CMGT 235 – Mechanical and Electrical Systems

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| Homework #1 | Due: 8/26 |

Show all work for full credit.

5 pts E [20 pts total]

**Name**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. A 500-g copper coffee mug is filled with 200-g of coffee. How much heat was required to heat the cup and coffee from 20°c to 96°C? Give answer in kJ.
2. A family of four each showering for 10 minutes a day consumes 700 gal of hot water a week. Water for the shower comes into the home at 55°F and needs to be heated to 120°F. Calculate the heat required per week and the heat requirement for one year.
3. For Problem 2. If natural gas costs $10 / MM BTU (1 MM BTU= 1000000 BTU) and electricity costs $0.092 per kWh, calculate the annual cost for gas and the annual cost for electricity. Which energy source is more expensive?
4. A 10 ft x 10 ft concrete wall 6 in thick is at a temperature of 65°F. If after prolonged exposure to sunlight the concrete wall is storing 65,520 Btu, what is the temperature of the concrete wall?